REMARKS

Claims 12 to 23 are pending in the present application.

In view of the following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

Applicants thank the Examiner for considering the previously filed Information Disclosure Statement, PTO-1449 paper and cited references.

Applicants note with appreciation the indication that copies of the certified copies of the priority documents have been received. Applicants request, however, that the Examiner specifically indicate that *all* of the copies of the certified copies have been received (check box 13.a). Further, Applicants respectfully request acknowledgment of the claim for foreign priority.

Claims 12 to 23 were rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,376,824 ("Michenfelder et al."). It is respectfully submitted that the "Michenfelder" reference is not prior art under 35 U.S.C. § 102(e) for the following reasons.

The "Michenfelder" reference is based on PCT Application No. PCT/DE99/00665 for which the listed § 371/102(e) date is **February 15, 2000**. In this regard, since the PCT application was filed on March 11, 1999, which is before November 29, 1999, the prior art date of the reference is determined under 35 U.S.C. § 102 (e) prior to the amendments by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002. Accordingly, the § 102 (e) date for the "Michenfelder" reference is **February 15, 2000**.

The present application was filed in the United States Patent and Trademark Office on May 31, 2002 and claims foreign priority to Application No. 199 33 642.3 (a certified translation of which is enclosed herein) filed in the Federal Republic of Germany on **July 17, 1999**. Because the priority date of **July 17, 1999** is before **February 15, 2000** (which is the § 102 (e) date of "Michenfelder"), the "Michenfelder" reference is not prior art under 35 U.S.C. § 102(e). Therefore, withdrawal of the 35 U.S.C. §102 (e) rejection and allowance of claims 12 to 23 is respectfully requested.

It is therefore respectfully submitted that all of the claims 12 to 23 are allowable.

CONCLUSION

In view of the above, it is believed that the rejections have been obviated, and that claims 12 to 23 are allowable. It is therefore respectfully requested that the rejections be withdrawn, and that the ~~present application~~ issue as early as possible.

Respectfully submitted,
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LIGHT-SENSITIVE SENSOR UNIT, IN PARTICULAR FOR AUTOMATIC SWITCHING OF LIGHTING DEVICES

Background Information

The present invention relates to a light-sensitive sensor unit, in particular for automatic switching of lighting devices in vehicles, according to the definition of the species of Claim 1.

Such a sensor unit is known from German Patent 195 23 262.3, which includes a global sensor and a directional sensor for detecting the lighting conditions outside the vehicle. The sensor unit is connected to the analyzer unit which determines from the signals of the sensor unit whether a change in the circuit state of the lighting device is necessary under the given lighting conditions prevailing in the surroundings of the vehicle. Although this known sensor unit permits automatic switching of the lighting device, it includes a relatively large number of parts due to the global sensors and the directional sensors, and this means a high cost and expensive adjustment.

Advantages of the Invention

The device according to the present invention having the features of Claim 1 has the advantage that a simple, compact, robust, easy-to-assemble and practically adjustment-free sensor unit is available due to the integration of the global and directional sensors. Furthermore, the device includes only a minimal number of components, which permits simple and inexpensive production with expanded functionality. The small dimensions which are possible due to the integration of the global and directional sensors have proven to be another major

advantage, because the size of components on the windshields of motor vehicles which interfere with vision should be minimized.

Advantageous refinements of the sensor unit according to the main claim are possible through the features characterized in the subclaims.

Due to the fact that at least three sensors detect light from predetermined directions, a wider range in front of the vehicle is detected. If at least one sensor is arranged in the direction of travel and the two other sensors are arranged, pivoted out of the direction of travel by an angle α on both sides, this yields a wide cone of detection in front of the vehicle, so that even the entrance of a tunnel which is not yet in the direction of travel can be detected and the lighting devices controlled accordingly.

If the directional sensors have lens-like elements, which may also have a smooth transition between them, the detection cone may be adjusted individually to the wishes of the automobile manufacturer.

Integration of the light guide body of the sensor unit into a light guide body of a rain sensor device makes it possible to eliminate additional components and to further reduce the number of components on the windshield which interfere with vision, in particular when the light guide body is manufactured in a multicomponent injection molding process together with the light guide body of the rain sensor and the coupling medium.

Brief Description of the Drawing

An embodiment of the present invention is illustrated in Figs. 1 and 2 and explained in greater detail in the following description. Fig. 1 shows a section through a sensor unit

according to the present invention, and Fig. 2 shows a diagram of the sensor unit integrated into a light guide body of a rain sensor in a perspective view.

Detailed Description of the Embodiment

Fig. 1 shows a sensor unit 10 according to the present invention, mounted on a windshield 11, in particular a windshield of a motor vehicle. Sensor unit 10 is composed of multiple sensors 12, each sensor 12 including a sensor element 13 and a light guide element 14, 14a. However, two light guide elements 14 here together use one sensor element 13, so that there are three light-sensitive sensor elements 13 having four light guide elements 14 and 14a. The light guide body on which light guide elements 14, 14a are mounted is composed of an at least partially transparent plate having cylindrical recesses sealed with lens-shaped round bodies. These cylindrical recesses together with the lens-shaped round bodies form a light guide element 14, 14a. If parallel light passes through the lens-shaped round bodies along the center axis of the cylindrical recesses, it yields a focal point f which characterizes a focal distance of light guide element 14, 14a.

Sensor elements 13 are each arranged between focal points f of light guide elements 14 and light guide elements 14 themselves. This yields a light detection cone directed forward in the direction of travel, allowing detection in predetermined directions. The cone angle of the light detection cone can be adjusted through the distance between focal points f of respective light guide element 14 and light-sensitive sensor elements 13.

An analyzer unit 15 controls the switching of a lighting device 16 as a function of the signals of sensor elements 13. Sensor elements 13 may be mounted jointly to a circuit board 17 and are preferably designed to permit a differentiation between daylight and artificial light to prevent a shutdown

due to artificial lighting in a tunnel, for example. This can be accomplished through a suitable choice of the sensitivity range of sensor elements 13. It is also possible to select the sensitivity range so that certain spectral ranges or characteristic lines, e.g., of gas discharge lamps, are detected, thus permitting control of the high and low beams in a motor vehicle.

In addition to these directional sensors, at least one light guide element 14a is aimed forward but not necessarily in the direction of travel. The light detection cone of this minimum of one light guide element 14a has a very large cone angle and detects global lighting conditions outside the vehicle.

All light guide elements 14, 14a, in particular the sensors of the global sensors and directional sensors, are combined in one piece in a light guide body 18. This light guide body 18 may be manufactured as an injection molded part of transparent or UV-permeable plastic. It is likewise possible to manufacture light guide body 18 of a pigmented or coated plastic which includes an optionally desired filter effect for influencing the sensitivity range of the sensor. This light guide body is pressed onto the windshield over a coupling medium 19, e.g., a silicone pad. Coupling medium 19 prevents air inclusions between windshield 11 and light guide body which would cause unwanted scattering. It is also possible to apply coupling medium 19 directly to light guide body 18 in the manufacture thereof in a multicomponent injection molding process.

What is claimed is:

1. A light-sensitive sensor unit (10), in particular for automatic switching of lighting devices, preferably in motor vehicles, including at least two light-sensitive sensors (12) which are provided with light guide elements (14, 14a) having a predeterminable reception characteristic, at least one first sensor (12) detecting the global lighting conditions, and at least one second sensor (12) detecting the lighting conditions in predetermined directions,
wherein the light guide elements (14, 14a) provided for the sensors (12) are joined in one piece to form a light guide body (18).

2. The sensor unit according to Claim 1,
wherein at least three sensors (12) detect light from predetermined directions.

3. The sensor unit according to one of Claims 1 or 2,
wherein at least one sensor (12) is aligned with a predetermined direction in the direction of travel of a vehicle.

4. The sensor unit according to one of Claims 1 through 3,
wherein at least one sensor (12) which detects the lighting conditions in a predetermined direction forms an angle α with a straight line in the direction of travel of a vehicle.

5. The sensor device according to Claim 4,
wherein two sensors (12) on each side each enclose an angle α with a straight line pointing in the direction of travel and have a common light-sensitive sensor element (13).

6. The sensor device according to one of Claims 1 through 5,
wherein there is a smooth transition between the light guide elements (14, 14a).

7. The sensor device according to one of the preceding claims, wherein the light detection cones of the light guide elements (14, 14a) overlap.

8. The sensor device according to one of the preceding claims, wherein the sensor elements (13) are designed as sensor elements (13) which distinguish between daylight and artificial light.

9. The sensor device according to one of the preceding claims, wherein the analyzer unit (15) is designed as an analyzer unit (15) which distinguishes between daylight and artificial light.

10. The sensor device according to one of the preceding claims,
wherein the light guide body (17) [sic; (18)] is integrated into a light guide body of a rain sensor device.

11. The sensor device according to Claim 8,
wherein the light guide body (17) [(18)] is manufactured in a multicomponent injection molding process, in particular together with the light guide body of the rain sensor and a coupling medium.

Abstract of the Disclosure

A light-sensitive sensor unit, in particular for automatic switching of lighting devices, preferably in motor vehicles, including at least two light-sensitive sensors, at least one first sensor detecting the global lighting conditions, and at least one second sensor detecting the lighting conditions in predetermined directions. All light guide elements provided for the sensors are joined in one piece to form a light guide body.

(Fig. 1)